

1 We claim:

- 1 1. A method for peer-to-peer system recovery, wherein said peer-to-peer  
2 system comprises a plurality of virtual tape controllers in communication with a first  
3 virtual tape server and a second virtual tape server, comprising the steps of:  
4 generating a shutdown key regarding the status of said first virtual tape server;  
5 saving said shutdown key in each of said plurality of virtual tape controllers;  
6 taking said first virtual tape server out of operation at a first time;  
7 taking said second virtual tape server out of operation at a second time;  
8 placing said second virtual tape server in operation at a third time;  
9 determining if said first virtual tape is in operation at said third time;  
10 operative if said first virtual tape is not in operation at said third time:  
11 setting a VTC agreement threshold;  
12 determining by each virtual tape controller whether to place said second virtual  
13 tape server on-line;  
14 determining if the number of virtual tape controllers electing to place said second  
15 virtual tape server on-line is greater than said VTC agreement threshold;  
16 operative if the number of virtual tape controllers electing to place said second  
17 virtual tape server on-line is greater than said VTC agreement threshold, placing said  
18 peer-to-peer system on-line with only said second virtual tape server in operation.
- 1 2. The method of claim 1, further comprising the step of operative if the  
2 number of virtual tape controllers electing to place said second virtual tape server on-line

3 is not greater than said VTC agreement threshold, keeping said peer-to-peer system off-  
4 line.

1 3. The method of claim 1, further comprising the step of providing a  
2 command to take said first virtual tape server out of operation.

1 4. The method of claim 3, further comprising the steps of:  
2 providing said command to a first one of said plurality of virtual tape controllers;  
3 providing said command from said first virtual tape controller to the remaining  
4 virtual tape controllers.

1 5. The method of claim 3, wherein said first command comprises a command  
2 execution mode.

1 6. The method of claim 7, wherein said command execution mode is selected  
2 from the group consisting of normal mode, expedite mode, immediate mode, and forced  
3 mode.

1 7. A method for peer-to-peer system recovery, wherein said peer-to-peer  
2 system comprises a plurality of virtual tape controllers in communication with a first  
3 virtual tape server and a second virtual tape server, comprising the steps of:  
4 generating a shutdown key regarding the status of said first virtual tape server and  
5 said second virtual tape server;  
6 saving said shutdown key in each of said plurality of virtual tape controllers;  
7 taking said first virtual tape server and said second virtual tape server out of  
8 operation at a first time;

9            attempting at a second time to return said first virtual tape server and said second  
10 virtual tape server to operation;  
11            determining if both said first VTS and said second VTS are returned to operation  
12 at said second time;  
13            operative if both said first VTS and said second VTS are returned to operation at  
14 said second time, placing said peer-to-peer system on-line with both said first virtual tape  
15 server and said second virtual tape server in operation.

1            8.        The method of claim 7, further comprising the steps of:

2            operative if one of said first VTS and said second VTS is operational and the  
3 other remains out of operation at said second time, determining by each virtual tape  
4 controller whether to place the operational virtual tape server on-line;

5            determining if the number of virtual tape controllers electing to place said  
6 operational virtual tape server on-line is greater than said VTC agreement threshold;

7            operative if the number of virtual tape controllers electing to place said  
8 operational virtual tape server on-line is greater than said VTC agreement threshold,  
9 placing said peer-to-peer system on-line with only said operational virtual tape server in  
10 operation.

1            9.        The method of claim 8, further comprising the step of operative if the  
2 number of virtual tape controllers electing to place said operational virtual tape server on-  
3 line is not greater than said VTC agreement threshold, keeping said peer-to-peer system  
4 off-line.

1           10.     An article of manufacture comprising a computer useable medium having  
2     computer readable program code disposed therein for peer-to-peer system recovery,  
3     wherein said peer-to-peer system comprises a plurality of virtual tape controllers,  
4     including said article of manufacture, in communication with a first virtual tape server  
5     and with a second virtual tape server, the computer readable program code comprising a  
6     series of computer readable program steps to effect:

7           generating a shutdown key regarding the status of said first virtual tape server;  
8           saving said shutdown key;  
9           taking said first virtual tape server out of operation at a first time;  
10          taking said second virtual tape server out of operation at a second time;  
11          placing said second virtual tape server in operation at a third time;  
12          determining if said first virtual tape is in operation at said third time;  
13          operative if said first virtual tape is not in operation at said third time:  
14          setting a VTC agreement threshold;  
15          determining whether to place said second virtual tape server on-line;  
16          determining if the number of virtual tape controllers electing to place said second  
17     virtual tape server on-line is greater than said VTC agreement threshold;  
18          operative if the number of virtual tape controllers electing to place said second  
19     virtual tape server on-line is greater than said VTC agreement threshold, placing said  
20     peer-to-peer system on-line with only said second virtual tape server in operation.

1           11.     The article of manufacture of claim 10, said computer readable program  
2     code further comprising a series of computer readable program steps to effect keeping

3 said peer-to-peer system off-line if the number of virtual tape controllers electing to place  
4 said second virtual tape server on-line is not greater than said VTC agreement threshold.

1 12. The article of manufacture of claim 10, said computer readable program  
2 code further comprising a series of computer readable program steps to effect providing  
3 said first command to the remaining virtual tape controllers.

1 13. The article of manufacture of claim 10, wherein said first command  
2 comprises a command execution mode.

1 14. The article of manufacture of claim 13, wherein said command execution  
2 mode is selected from the group consisting of normal mode, expedite mode, immediate  
3 mode, and forced mode.

1 15. An article of manufacture comprising a computer useable medium having  
2 computer readable program code disposed therein for peer-to-peer system recovery,  
3 wherein said peer-to-peer system comprises a plurality of virtual tape controllers,  
4 including said article of manufacture, in communication with a first virtual tape server  
5 and with a second virtual tape server, the computer readable program code comprising a  
6 series of computer readable program steps to effect:

7 generating a shutdown key regarding the status of said first virtual tape server and  
8 said second virtual tape server;

9 saving said shutdown key;

10 taking said first virtual tape server and said second virtual tape server out of  
11 operation at a first time;

12            attempting at a second time to return said first virtual tape server and said second  
13   virtual tape server to operation;  
14            determining if both said first VTS and said second VTS are returned to operation  
15   at said second time;  
16            operative if both said first VTS and said second VTS are returned to operation at  
17   said second time, placing said peer-to-peer system on-line with both said first virtual tape  
18   server and said second virtual tape server in operation.

1            16.    The article of manufacture of claim 15, said computer readable program  
2   code further comprising a series of computer readable program steps to effect:

3            operative if one of said first VTS and said second VTS is operational and the  
4   other remains out of operation at said second time, determining whether to place the  
5   operational virtual tape server on-line;

6            determining if the number of virtual tape controllers electing to place said  
7   operational virtual tape server on-line is greater than said VTC agreement threshold;

8            operative if the number of virtual tape controllers electing to place said  
9   operational virtual tape server on-line is greater than said VTC agreement threshold,  
10   placing said peer-to-peer system on-line with only said operational virtual tape server in  
11   operation.

1            17.    The article of manufacture of claim 16, said computer readable program  
2   code further comprising a series of computer readable program steps to effect operative if  
3   the number of virtual tape controllers electing to place said operational virtual tape server

4 on-line is not greater than said VTC agreement threshold, keeping said peer-to-peer  
5 system off-line.

1 18. A computer program product usable with a programmable computer  
2 processor having computer readable program code embodied therein for peer-to-peer  
3 system recovery, wherein said peer-to-peer system comprises a plurality of virtual tape  
4 controllers in communication with a first virtual tape server and with a second virtual  
5 tape server, comprising:

6 computer readable program code which causes said programmable computer  
7 processor to generate a shutdown key regarding the status of said first virtual tape server;

8 computer readable program code which causes said programmable computer  
9 processor to save said shutdown key;

10 computer readable program code which causes said programmable computer  
11 processor to receive a first command to take said first virtual tape server out of operation  
12 at a first time;

13 computer readable program code which causes said programmable computer  
14 processor to receive a second command to take said second virtual tape server out of  
15 operation at a second time;

16 computer readable program code which causes said programmable computer  
17 processor to receive a second command to bring said second virtual tape server back in  
18 operation at a third time;

19 computer readable program code which causes said programmable computer  
20 processor to determine if said first virtual tape is in operation at said third time;

21 computer readable program code which, if first second virtual tape is not in  
22 operation at said third time, causes said programmable computer processor to retrieve a  
23 VTC agreement threshold;  
24 computer readable program code which, if said first virtual tape is not in operation  
25 at said third time, causes said programmable computer processor to determine whether to  
26 place said second virtual tape server on-line;  
27 computer readable program code which, if said first virtual tape is not in operation  
28 at said third time, causes said programmable computer processor to determine if the  
29 number of virtual tape controllers electing to place said second virtual tape server on-line  
30 is greater than said VTC agreement threshold;  
31 computer readable program code which, if said first virtual tape is not in operation  
32 at said third time and if the number of virtual tape controllers electing to place said  
33 second virtual tape server on-line is greater than said VTC agreement threshold, causes  
34 said programmable computer processor to place said peer-to-peer system on-line with  
35 only said second virtual tape server in operation.

1 19. The computer program product of claim 18, further comprising computer  
2 readable program code which, if said first virtual tape is not in operation at said third time  
3 and if the number of virtual tape controllers electing to place said second virtual tape  
4 server on-line is not greater than said VTC agreement threshold, causes said  
5 programmable computer processor to keep said peer-to-peer system off-line.



1           20.     The computer program product of claim 18, further comprising computer  
2 readable program code which causes said programmable computer processor to provide  
3 said first command to the remaining virtual tape controllers.

1           21.     The computer program product of claim 18, wherein said first command  
2 comprises a command execution mode.

1           22.     The computer program product of claim 22, wherein said command  
2 execution mode is selected from the group consisting of normal mode, expedite mode,  
3 immediate mode, and forced mode.

1           23.     A computer program product usable with a programmable computer  
2 processor having computer readable program code embodied therein for peer-to-peer  
3 system recovery, wherein said peer-to-peer system comprises a plurality of virtual tape  
4 controllers in communication with a first virtual tape server and with a second virtual  
5 tape server, comprising:

6           computer readable program code which causes said programmable computer  
7 processor to generate a shutdown key regarding the status of said first virtual tape server  
8 and said second virtual tape server;

9           computer readable program code which causes said programmable computer  
10 processor to save said shutdown key;

11          computer readable program code which causes said programmable computer  
12 processor to take said first virtual tape server and said second virtual tape server out of  
13 operation at a first time;

14 computer readable program code which causes said programmable computer  
15 processor to attempt at a second time to return said first virtual tape server and said  
16 second virtual tape server to operation;

17 computer readable program code which causes said programmable computer  
18 processor to determine if both said first VTS and said second VTS are returned to  
19 operation at said second time;

20 computer readable program code which, if both said first VTS and said second  
21 VTS are returned to operation at said second time, causes said programmable computer  
22 processor to place said peer-to-peer system on-line with both said first virtual tape server  
23 and said second virtual tape server in operation.

1 24. The computer program product of claim 23, further comprising:

2 computer readable program code which, if one of said first VTS and said second  
3 VTS is operational and the other remains out of operation at said second time, causes said  
4 programmable computer processor to determine whether to place the operational virtual  
5 tape server on-line;

6 computer readable program code which causes said programmable computer  
7 processor to determine if the number of virtual tape controllers electing to place said  
8 operational virtual tape server on-line is greater than said VTC agreement threshold;

9 computer readable program code which, if the number of virtual tape controllers  
10 electing to place said operational virtual tape server on-line is greater than said VTC  
11 agreement threshold, causes said programmable computer processor to place said peer-to-  
12 peer system on-line with only said operational virtual tape server in operation.

1           25.    The computer program product of claim 24, further comprising computer  
2   readable program code which, if the number of virtual tape controllers electing to place  
3   said operational virtual tape server on-line is not greater than said VTC agreement  
4   threshold, causes said programmable computer processor to keep said peer-to-peer  
5   system off-line.